Appendix F
Risk Assessment for State-Owned Assets

Contents of this Appendix

This appendix provides detailed documentation in support of Section Five – Risk Assessment for State-Owned Assets.

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Appendix F.1:
Flood

Vulnerability Assessment Parameters, Methodology and Results

The flood hazard vulnerability assessment of State-owned buildings and critical facilities in Louisiana involved an analysis of the parameters described below.

- Location within the Floodplain: Structures located within the 100-year floodplain were determined based on Digital Quality Level 3 (Q3) data. The Q3 data was derived from the FEMA FIRMs that were converted to digital format. Map 4-4 (Hazard Profile – Flood) shows the area of the 100-year floodplain in the State of Louisiana based on Q3 data. Map F-1 (Location of Critical Facilities – Flood) indicates the location of State-owned critical facilities in Louisiana in relation to the 100-year floodplain.
- Pre-FIRM vs. Post-FIRM Construction: Pre-FIRM structures are defined as buildings that were constructed in a community prior to their entry into the NFIP. Pre-FIRM structures did not have to be elevated above the 100-year (or base) flood elevation or meet other NFIP requirements. Post-FIRM structures were built after the community's enrollment into the NFIP (and establishment of a FIRM), and must to be elevated at or above the 100-year (or base) flood elevation and meet other requirements of the NFIP and the local floodplain management ordinance. In this Plan any structures built after 1982 (i.e., 1983 or later) were recognized as post-FIRM. This date was established by taking the average date that communities in Louisiana joined the NFIP.

Based on these two parameters, a vulnerability assessment level (low, medium or high) was assigned for each of the State-owned buildings and critical facilities. The three hazard vulnerability levels are defined below.

- Low Hazard Vulnerability: Structures located outside the 100-year floodplain.
- Medium Hazard Vulnerability: Post-FIRM structures located within the 100-year floodplain.
- High Hazard Vulnerability: Pre-FIRM structures located within the 100-year floodplain.

Map F-2, Vulnerability Assessment– Flood, shows State-owned critical facilities by level of vulnerability to the flood hazard.

Loss Estimate Parameters, Methodology and Results

The flood loss estimate of State-owned buildings and critical facilities in Louisiana involved an analysis of the parameters described below.

- Flood Hazard Vulnerability: As stated above, flood vulnerability assessments involved an analysis of two major parameters: location within the 100-year floodplain and whether the structure is of pre-FIRM or post-FIRM construction. Low, medium, and high vulnerability for flood are defined above.
- Average Flood Depth: Although the 100-year flood elevations were available from the NFIP's Q3 data, the flood depths for individual State-owned buildings and critical facilities could not be determined due to the lack of available first floor elevations for each structure. Therefore, average flood depths for individual structures were estimated based on their corresponding flood hazard vulnerability level. These basic flood depths are summarized below.
    - For low hazard vulnerability structures, no flood depth was used, since the structures were located outside the 100-year floodplain.

- For medium hazard vulnerability structures, an average flood depth of 0 feet above the first floor was used, since the structures were post-FIRM and assumed to be elevated at or above the 100-year flood elevation as required by the NFIP.
- For high hazard vulnerability structures, an average flood depth of 3 feet above the first floor was estimated, since the structures were pre-FIRM and did not have to be elevated at or above the 100-year flood elevation as required by the NFIP.

- Average Building Type: Although the building types for each structure were described in the statewide GIS database, an analysis of all building types for individual State-owned buildings and critical facilities was beyond the scope of this loss estimate. Therefore, in order to conduct basic analyses, individual loss estimates assumed an average building type of a single story structure without a basement. This average building type was determined based on experience with typical buildings and foundation construction techniques in Louisiana.
- Depth-Damage Functions (DDFs): Physical (building) damage, contents damage and loss of function (LOF) costs for each structure were estimated based on a series of DDFs. These DDFs were developed by the Flood Insurance Administration (FIA) based on flood claim data collected nationwide over many years for a wide range of building types. DDFs are used by FEMA in evaluating flood risk and determining cost effectiveness for its mitigation grant programs. The DDFs for building damage, contents damage and LOF days used for the flood loss estimates are summarized in the Table F.1-1.

Table F.1-1

Flood Hazard Vulnerability Level	Average Building Type	Average Flood Depth (above FFE)	Building DDF (%BRV)	Contents DDF (%BRV)	LOF (days)
Low	1 Story without Basement	None	0.0%	0.0%	0
Medium	1 Story without Basement (Post-FIRM)	0 feet	9.0%	7.0%	9
High	1 Story without Basement (Pre-FIRM)	3 feet	27.0%	20.5%	27

NOTES: 1.) FFE = First Floor Elevation
2.) Assume contents replacement value = 50% BRV

- Physical Damage: Physical damages were estimated as a percentage of the Building Replacement Value (BRV). For each structure, the BRV was determined based on building values obtained from the statewide GIS database. The physical damage costs were computed by multiplying the BRV by the corresponding building DDF.
- Contents Damage: Contents damages were estimated as a percentage of the contents replacement value. For each structure, the contents replacement value was estimated based on a percentage of the BRV determined from the statewide GIS database. Based on an analysis of HAZUS data for various building types, the contents replacement values were equal to an average of 50 percent of the BRVs. The contents damage costs were determined by multiplying the contents replacement value by the corresponding contents DDF.
- LOF: LOF costs were estimated as a proportion of the annual operating budget for each structure. The annual operating budgets for each facility were determined as a proportion of the current annual operating budget for the State of Louisiana. This annual operating budget, currently estimated at approximately $16.0 billion, is distributed to individual State-owned buildings and critical facilities based on the *factored square footage* of each structure. The factored square footage for each structure was determined by multiplying the actual square footage by a Criticality Factor (CF) based on the criticality of each structure. A summary of CFs is provided in Table F.2-2.

Note that by applying the CF to the square footage of each structure, it allows higher criticality facilities (such as fire stations) to obtain a larger proportion of the statewide annual budget, thereby increasing their annual budget values and LOF costs to reflect their importance. Once the annual operating budget was obtained for each structure, the LOF costs were computed by dividing the annual operating budget by 365 (to convert the annual budget to a daily budget) and multiplying by the corresponding Flood Damage Functions (WDFs) for LOF (measured in days).

Table F.2-2

Criticality Level of Facility	Criticality Factor (CF)
1	10
2	8
3	6
4	4
5	2
All Others	1

Once these parameters were determined, the combined loss estimate (building, contents, and loss of function) in dollars for each structure was determined using the following formula:

Combined Loss Estimate = (Physical Damage + Contents Damage + LOF)

The critical facilities in Louisiana with highest physical damage, contents damage and LOF costs for the flood hazard are presented in Maps F-3, F-4 and F-5 respectively. Map F-6 (also Map 6-4) presents the results of the combined flood loss estimate computations. The ten critical facilities in Louisiana with the highest combined loss estimates for the flood hazard are shown on Map F-7 (also Map 6-4) and are summarized in Table 6-6. State-owned critical facilities for each agency in Louisiana with the highest combined loss estimates for the flood hazard are presented in Maps F-8 thru F-20.

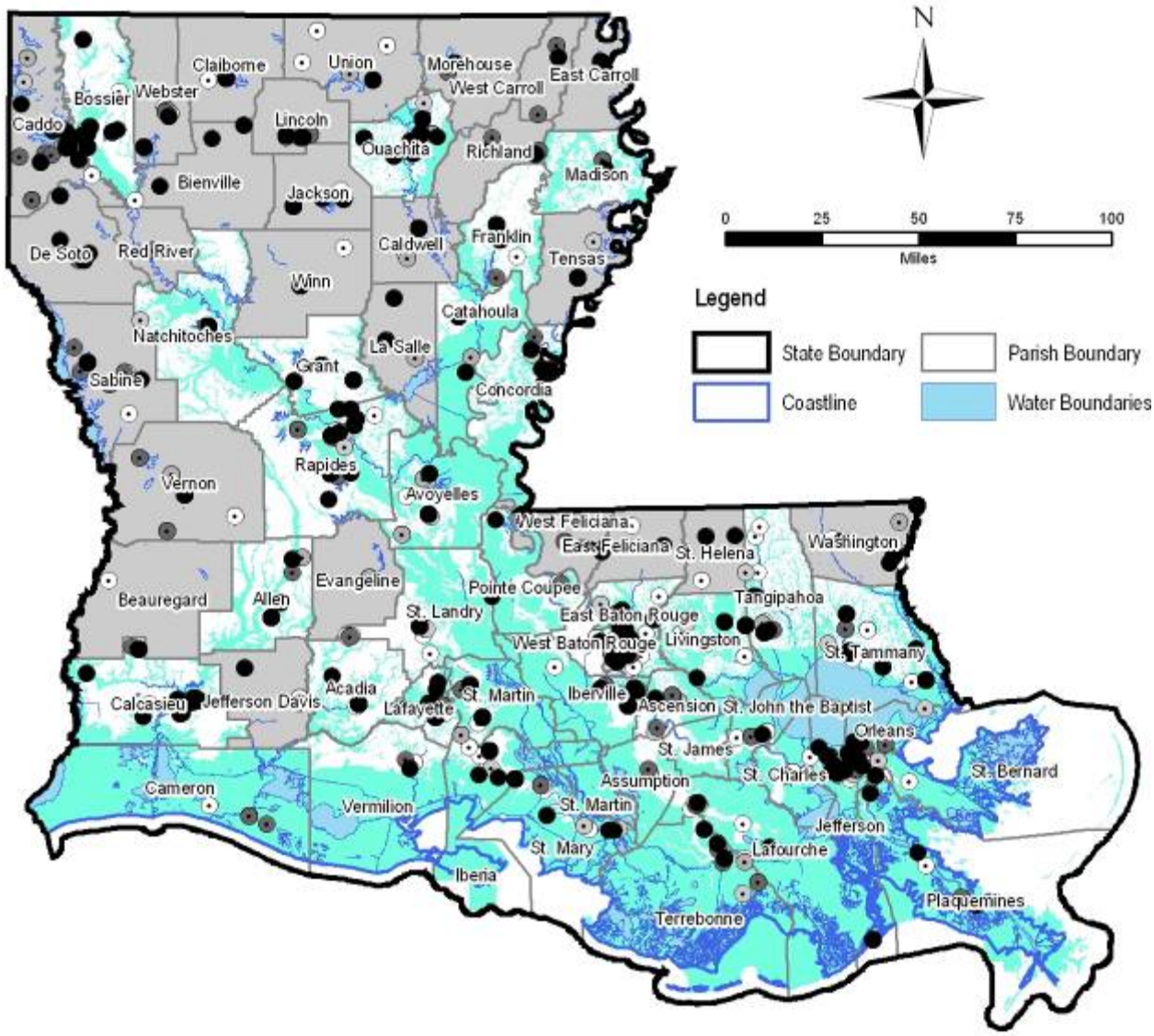
List of Assumptions

The flood loss estimate is based on the following assumptions.

- General: Flood loss estimates for individual structures are based on the 100-year flood taken from the available Q3 data. Note that assigning numerical values and factors for loss estimate parameters is often qualitative in nature and based on data from a number of sources with varying degrees of accuracy. For this reason, flood loss estimates for individual structures should not be used for estimating flood insurance coverage or other needs that require a high degree of accuracy.
- Flood Hazard Vulnerability and Average Flood Depth: Structures constructed outside the 100-year floodplain incur zero flood damages. All post-FIRM structures have been constructed with their first floor elevation at the 100-year flood elevation in accordance with NFIP regulations. All pre-FIRM structures have been constructed with their first floor elevation an average of 3 feet below the 100-year flood elevation and do not comply with NFIP regulations. In the event the statewide GIS database did not provide a construction date for an individual structure, the structure was considered to be pre-FIRM. In Louisiana, any structures built after 1982 (i.e., 1983 or later) were recognized as post-FIRM. This date was established by taking the average date that communities in Louisiana joined the NFIP; these dates vary between 1970 and 2003, but most were in the 1970s and 1980s.
- Average Building Type and DDFs: The physical and contents damages to individual State-owned buildings and critical facilities from flooding will be considered the same as a single story structure without a basement (i.e., slab-on-grade) constructed using standard residential building materials.

- Physical Damage: For each structure, the BRV is consistent with the building values obtained from the statewide GIS database. In the event the statewide GIS database did not provide a BRV for an individual structure, the BRV was estimated to be zero.
- Contents Damage: For each structure, the contents replacement value is equal to 50 percent of the BRV.
- LOF: The $16.0 billion current annual operating budget for the State of Louisiana is distributed among all State-owned buildings and critical facilities in the statewide GIS database based on the factored square footage of each structure. In the event the statewide GIS database did not provide a square footage and/or criticality level for an individual structure, that square footage and/or criticality level was estimated based on the average square footage and/or criticality level for all structures in the statewide GIS database with available data. The CFs were derived based loosely on FEMA's *What is a Benefit?* draft guidance document dated May 1, 2001 and engineering judgment.

Map F-1: Location of Critical Facilities - Flood



State-Owned Critical Facilities

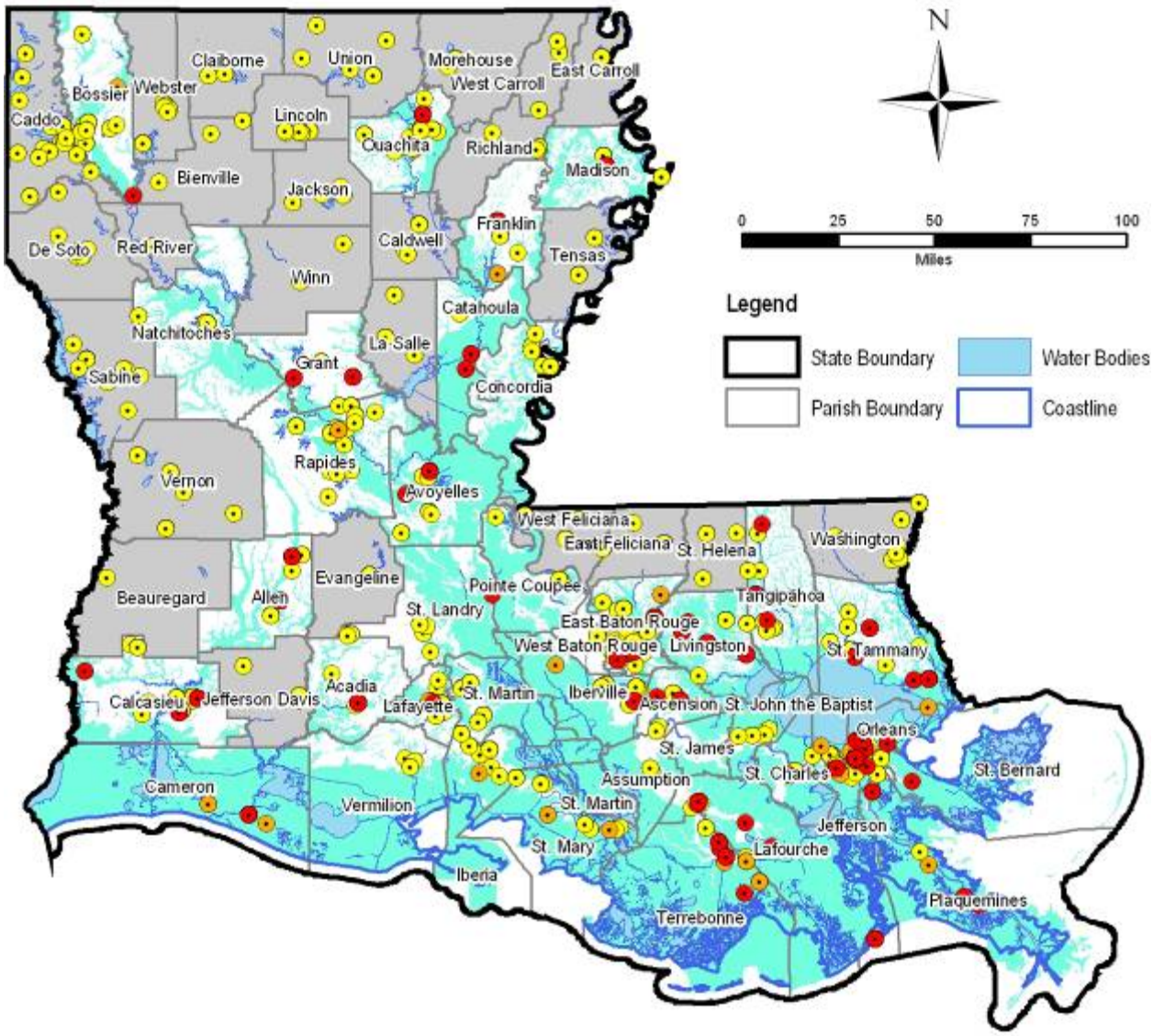
1 (High) 2 (Medium-High) 3 (Medium) 4 (Medium-Low) 5 (Low)

Source: Louisiana Facility Management Database

Q3 Flood Data No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-2: Vulnerability Assessment - Flood



Vulnerability; State-Owned Critical Facilities

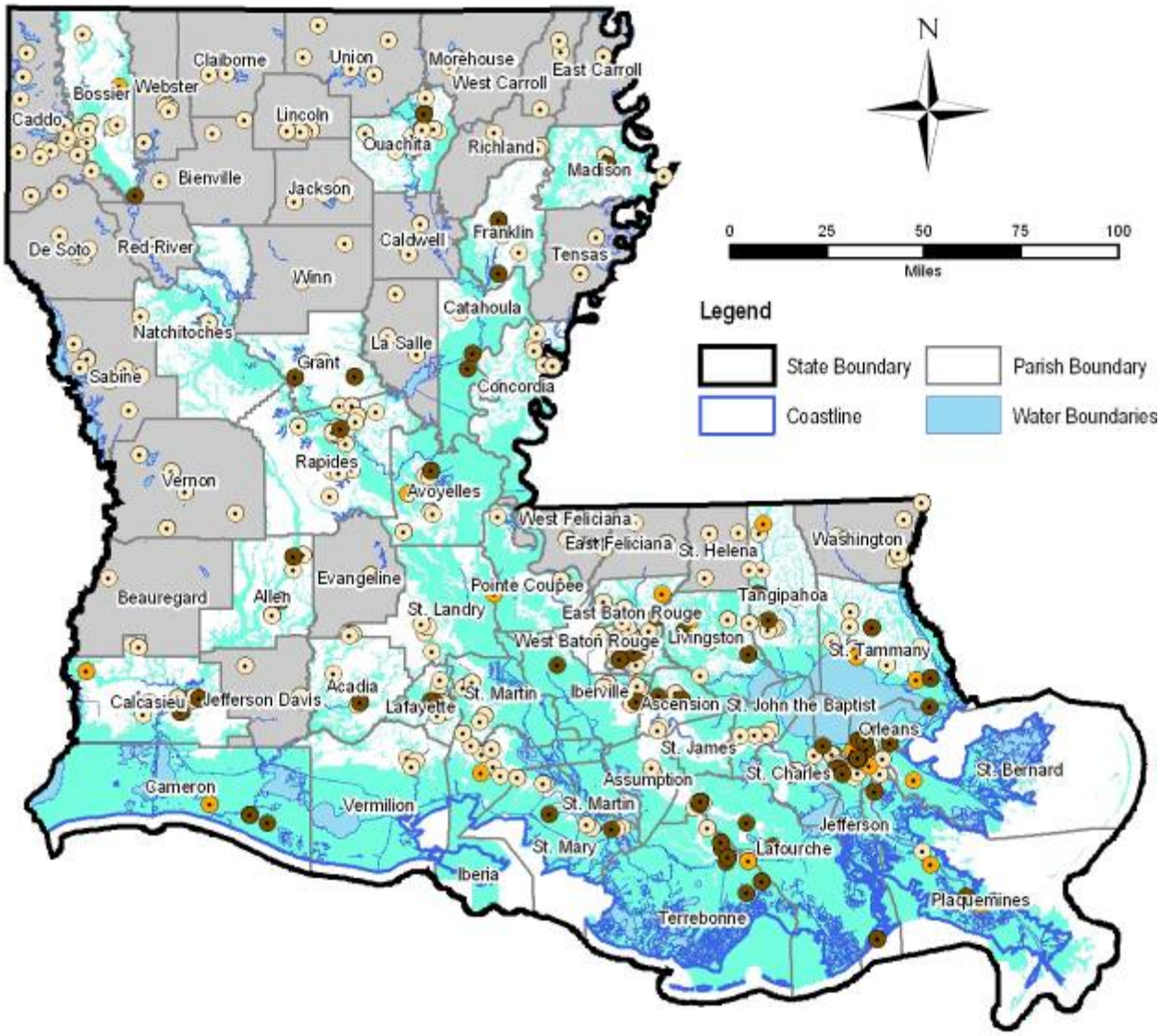
High (19% of Total) Medium (5% of Total) Low (76% of Total)

Source: Louisiana Facility Management Database

Q3 Flood Data No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-3: Loss Estimate - Flood - Physical Damage



Estimated Losses

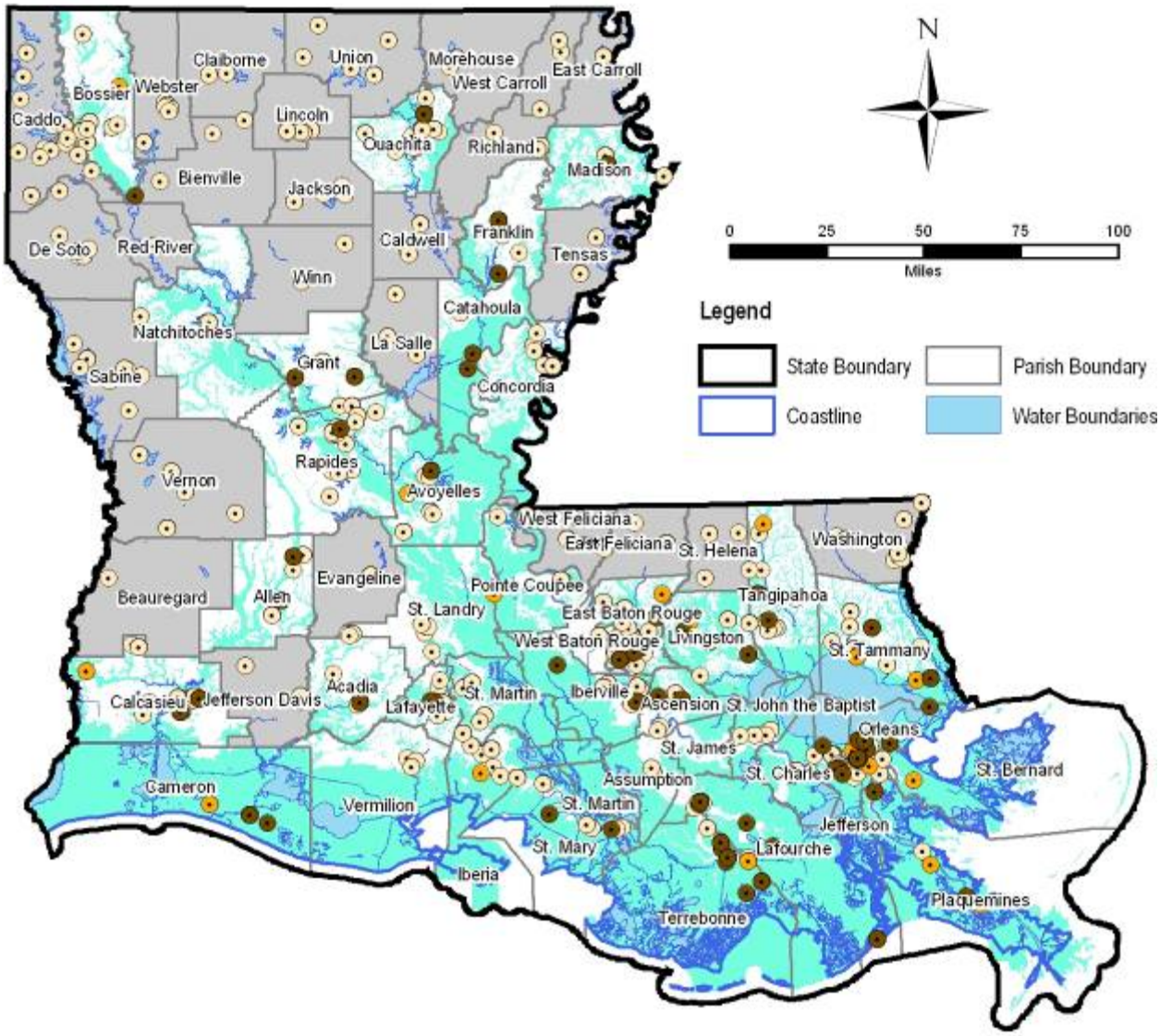
Low: $0 Medium: $1 - $4,000 High: $4,001 - $80,000,000

Source: Louisiana Facility Management Database

Q3 Flood Data No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-4: Loss Estimate - Flood - Contents



Estimated Losses

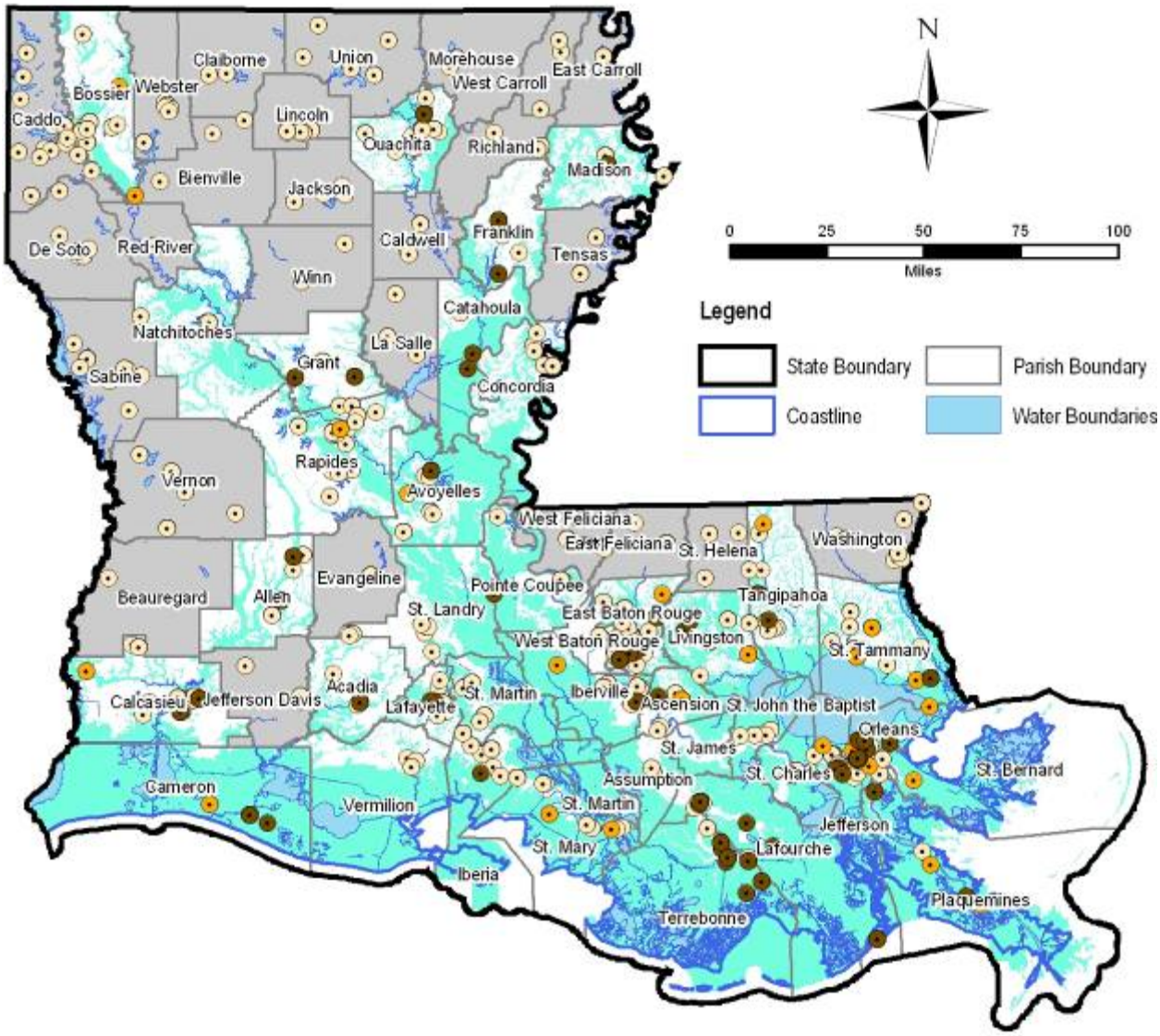
Low: $0 Medium: $1- $3,000 High: $3,001 - $60,000,000

Source: Louisiana Facility Management Database

Q3 Flood Data No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-5: Loss Estimate - Flood - Function



Estimated Losses

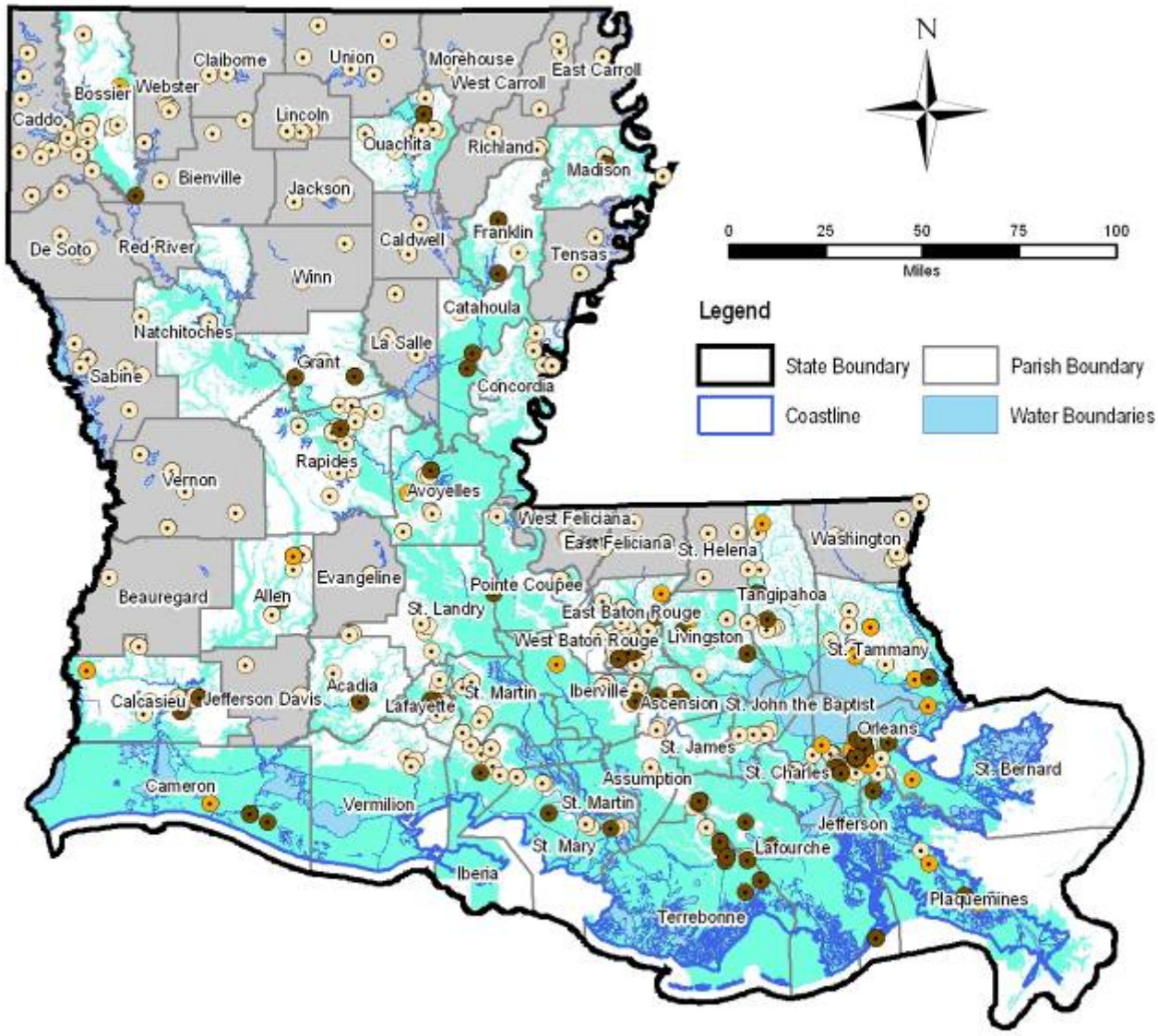
Low: $0 Medium: $1 - $10,000 High: $10,001 - $75,000,000

Source: Louisiana Facility Management Database

Q3 Flood Data No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-6: Loss Estimate - Flood - Total



Estimated Losses

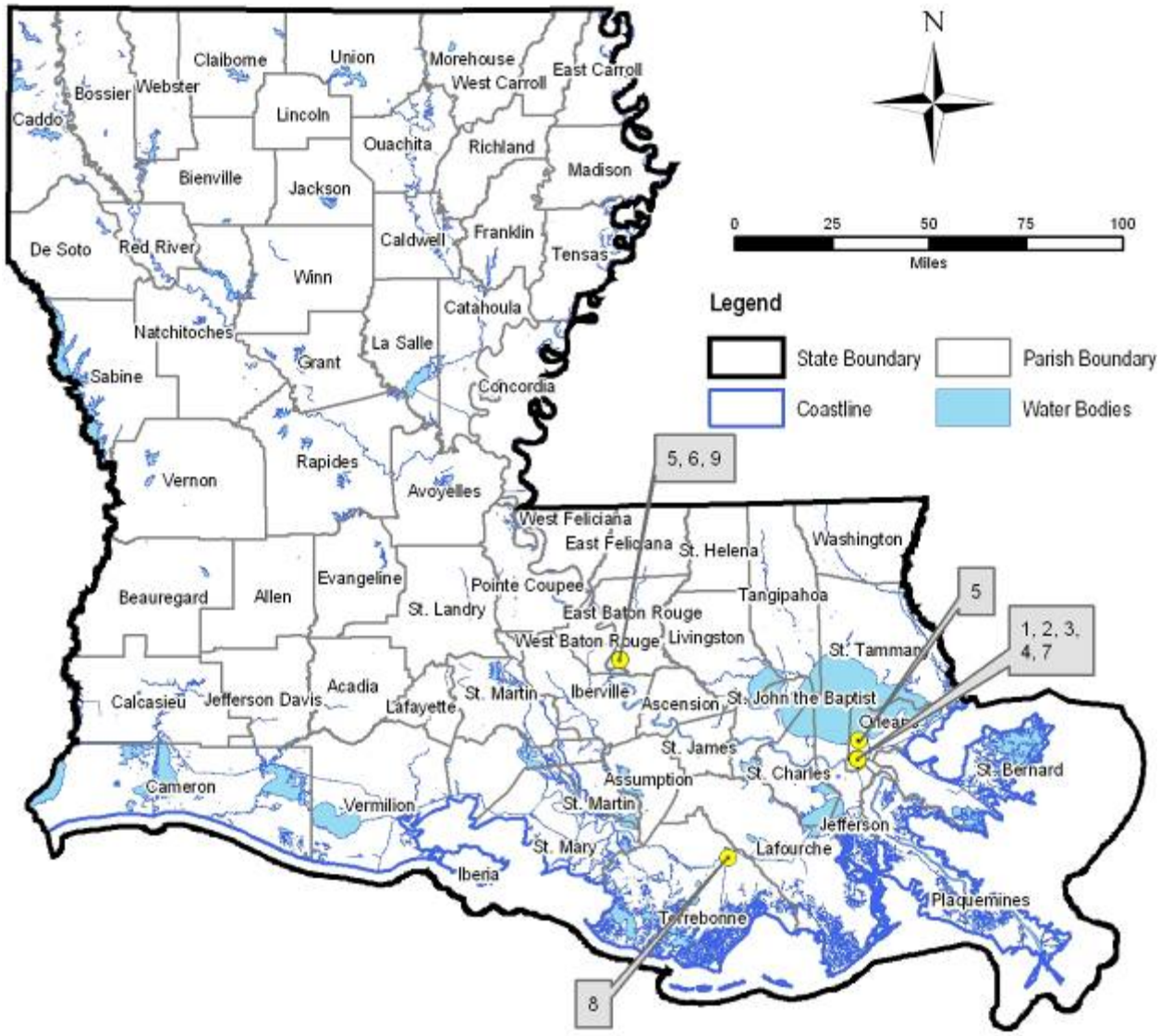
Low: $0 - $250 Medium: $251 - $20,000 High: $20,001 - $205,000,000

Source: Louisiana Facility Management Database

Q3 Flood Data No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

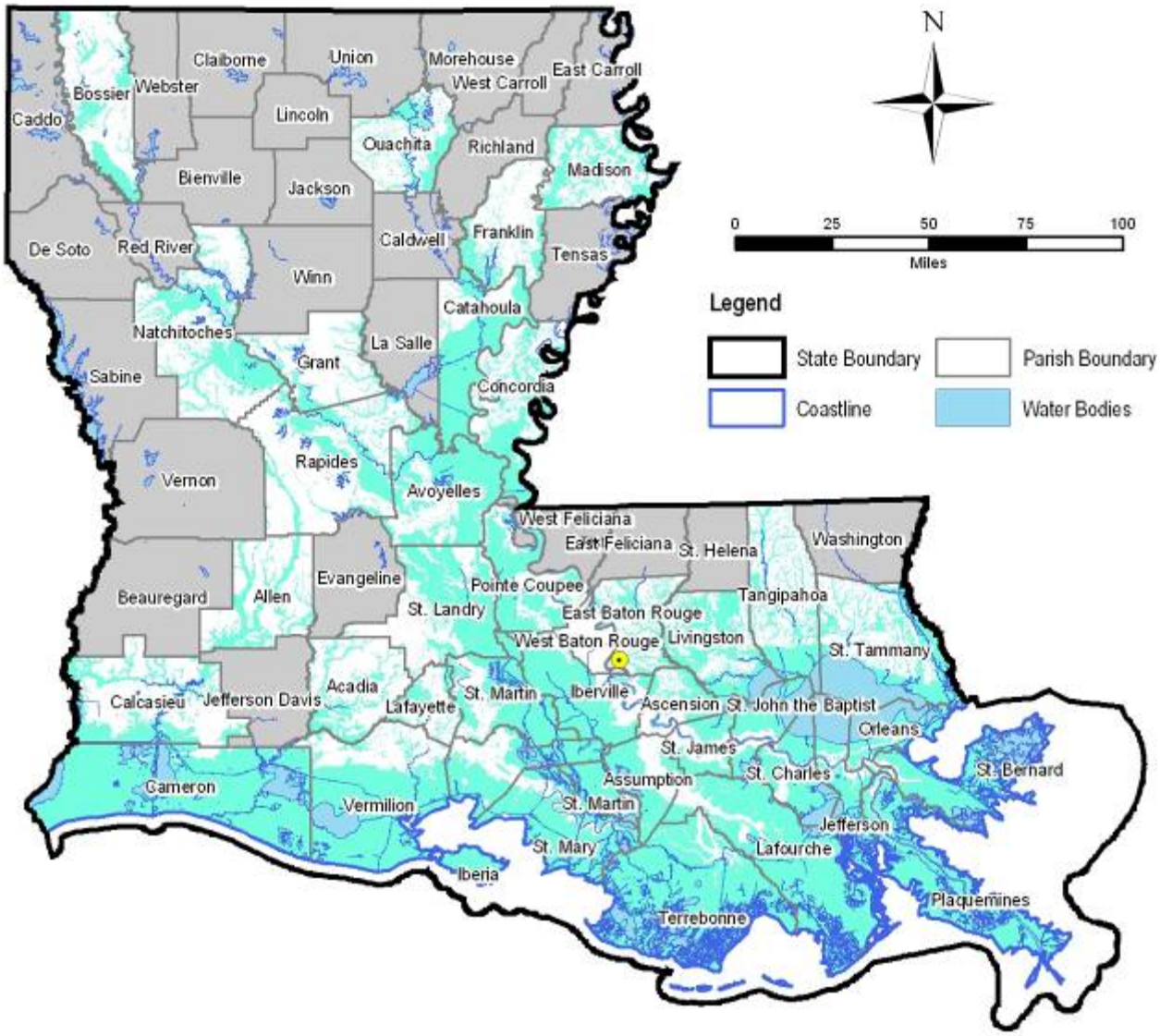
Map F-7: Loss Estimate - Flood - Top 10



Highest Loss Facilities

Source: Louisiana Facility Management Database

Map F-8: Loss Estimate - Flood - Top 10 - Ancillary Funds



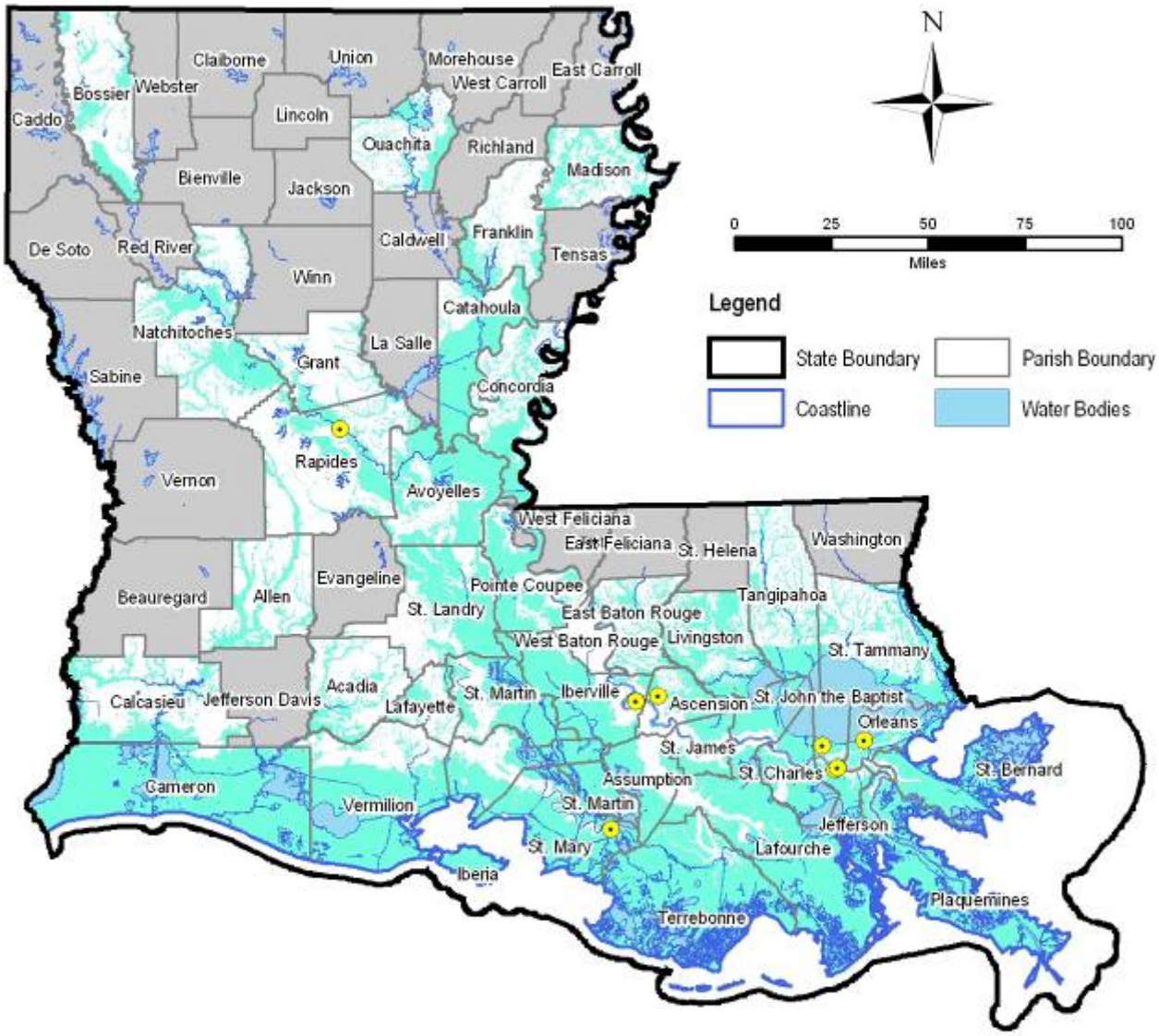
Highest Loss Facilities

Source: Louisiana Facility Management Database

Q3 Flood Data No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-9: Loss Estimate - Flood - Top 10 - Department of Public Safety and Corrections



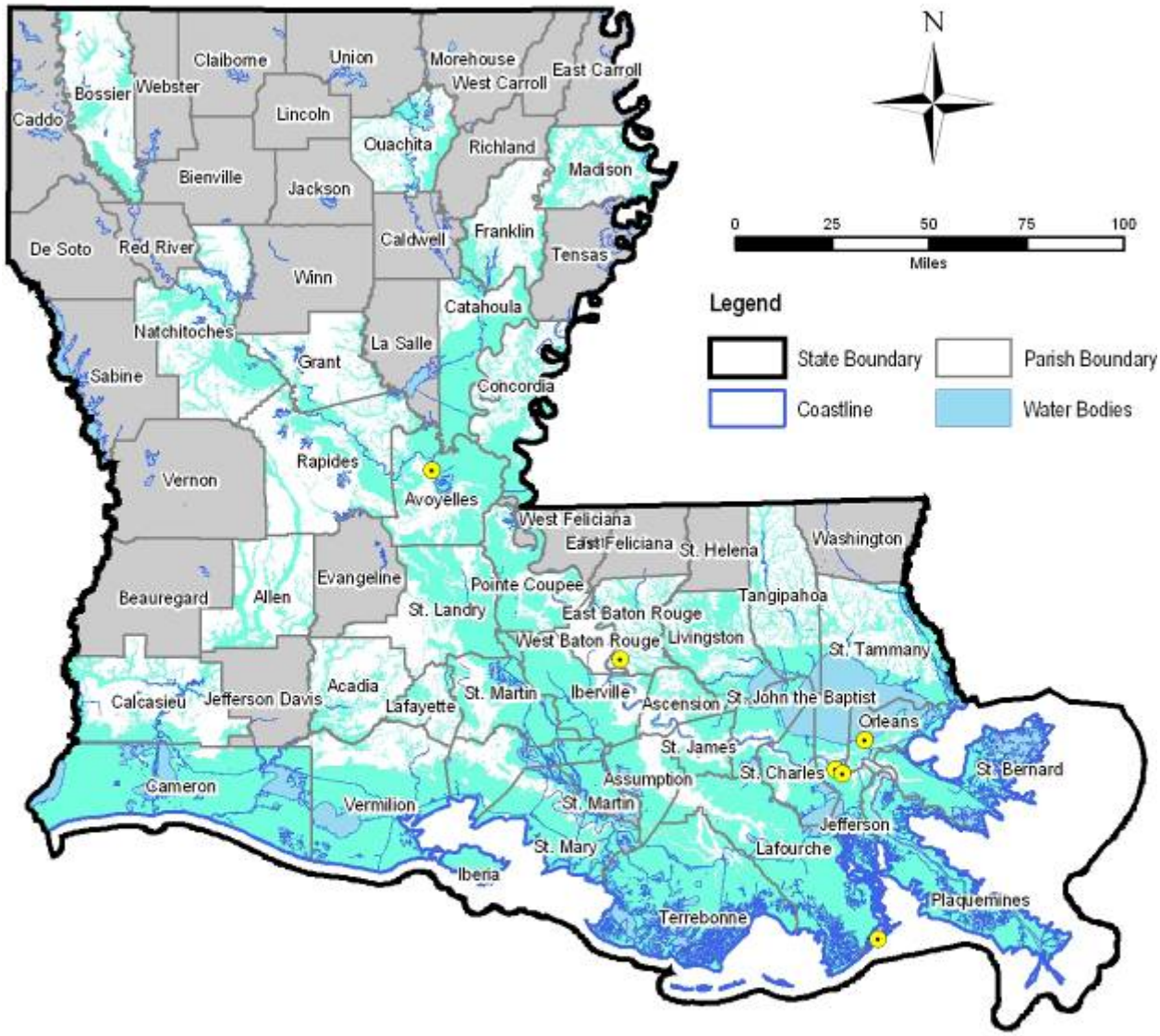
Highest Loss Facilities

Source: Louisiana Facility Management Database

Q3 Flood Data No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-10: Loss Estimate - Flood - Top 10 - Department of Culture, Recreation and Tourism



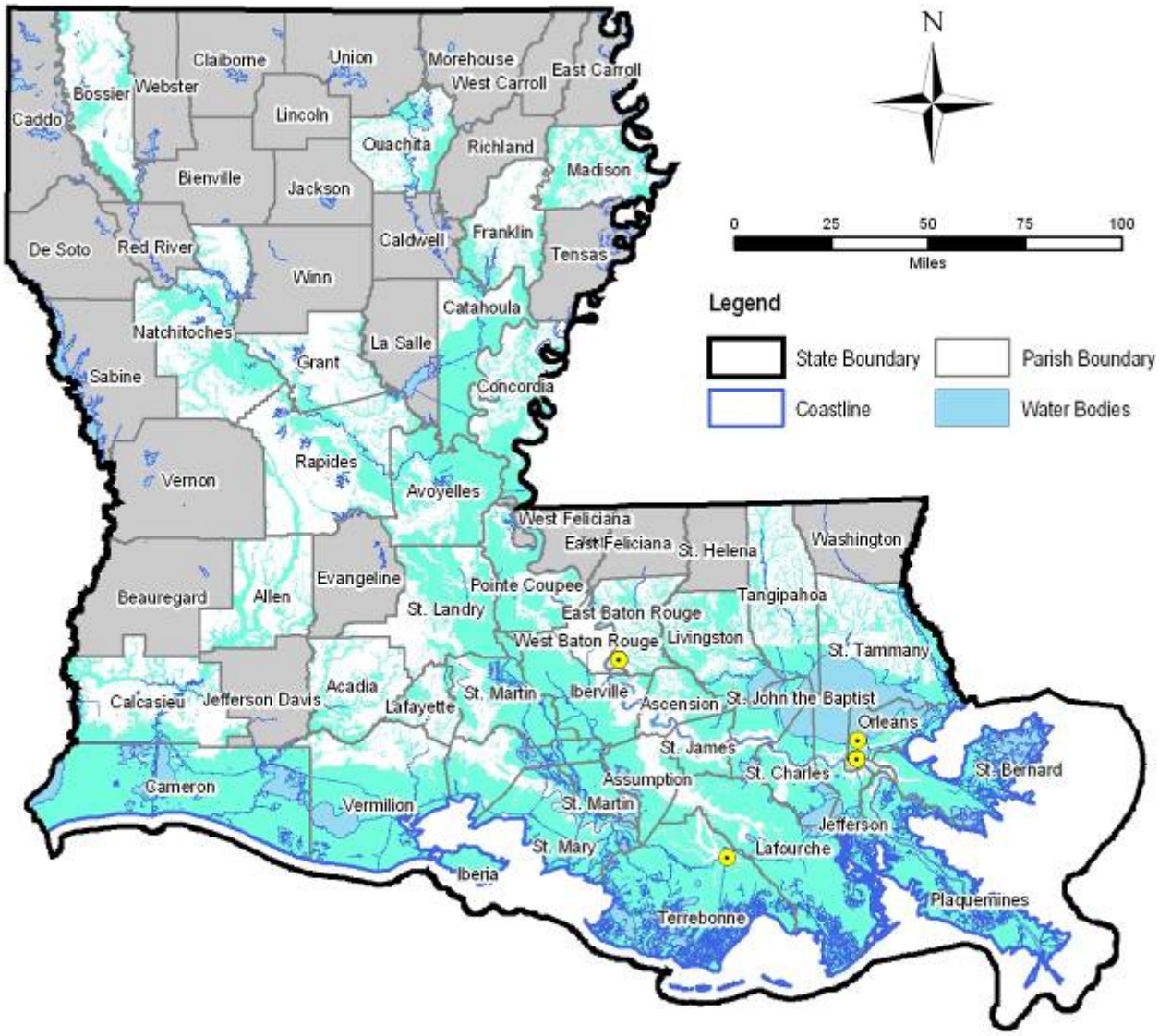
Highest Loss Facilities

Source: Louisiana Facility Management Database

Q3 Flood Data No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-11: Loss Estimate - Flood - Top 10 - Department of Education



Highest Loss Facilities

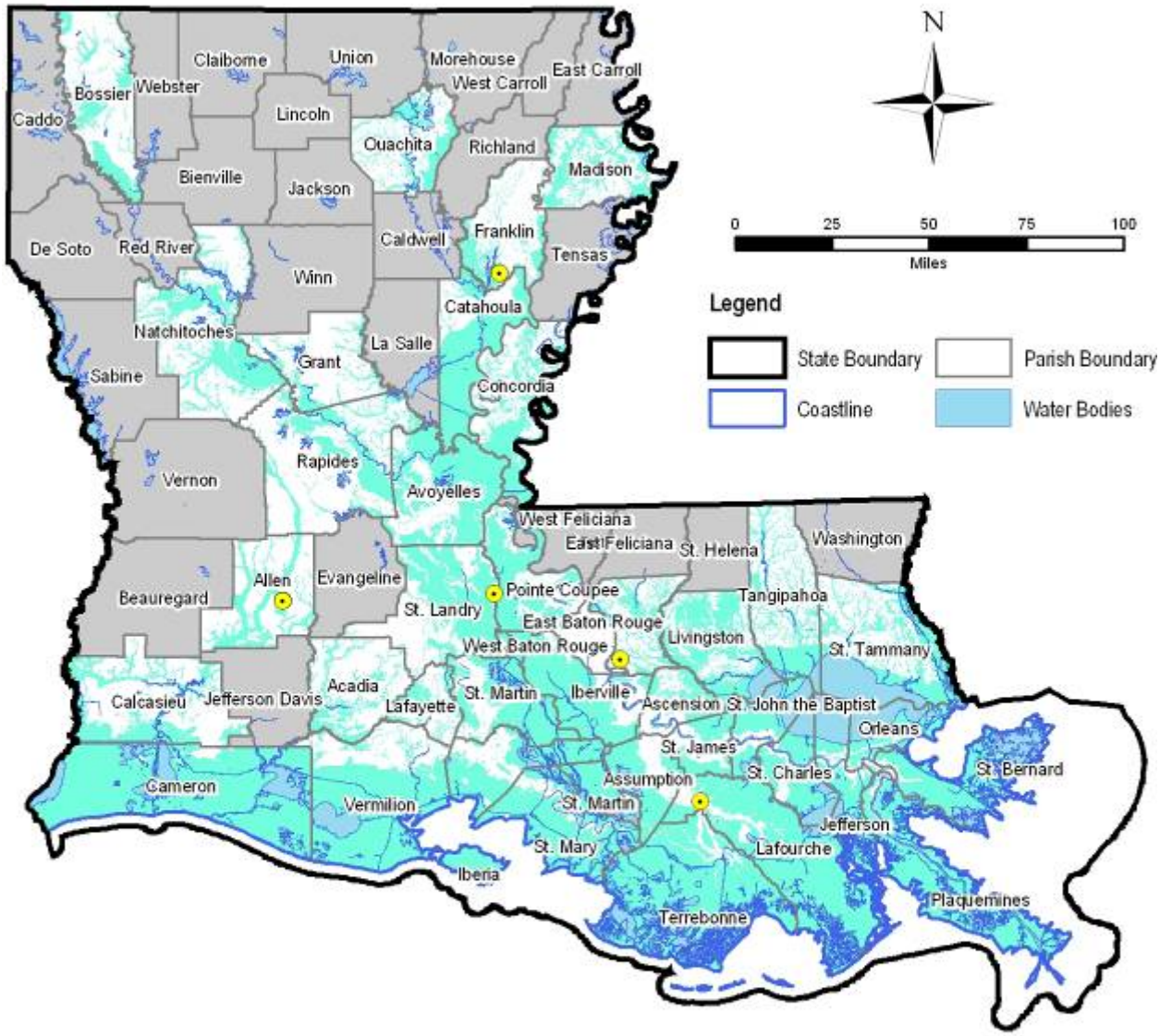
Source: Louisiana Facility Management Database

Q3 Flood Data

No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-12: Loss Estimate - Flood - Top 10 - Elected Officials



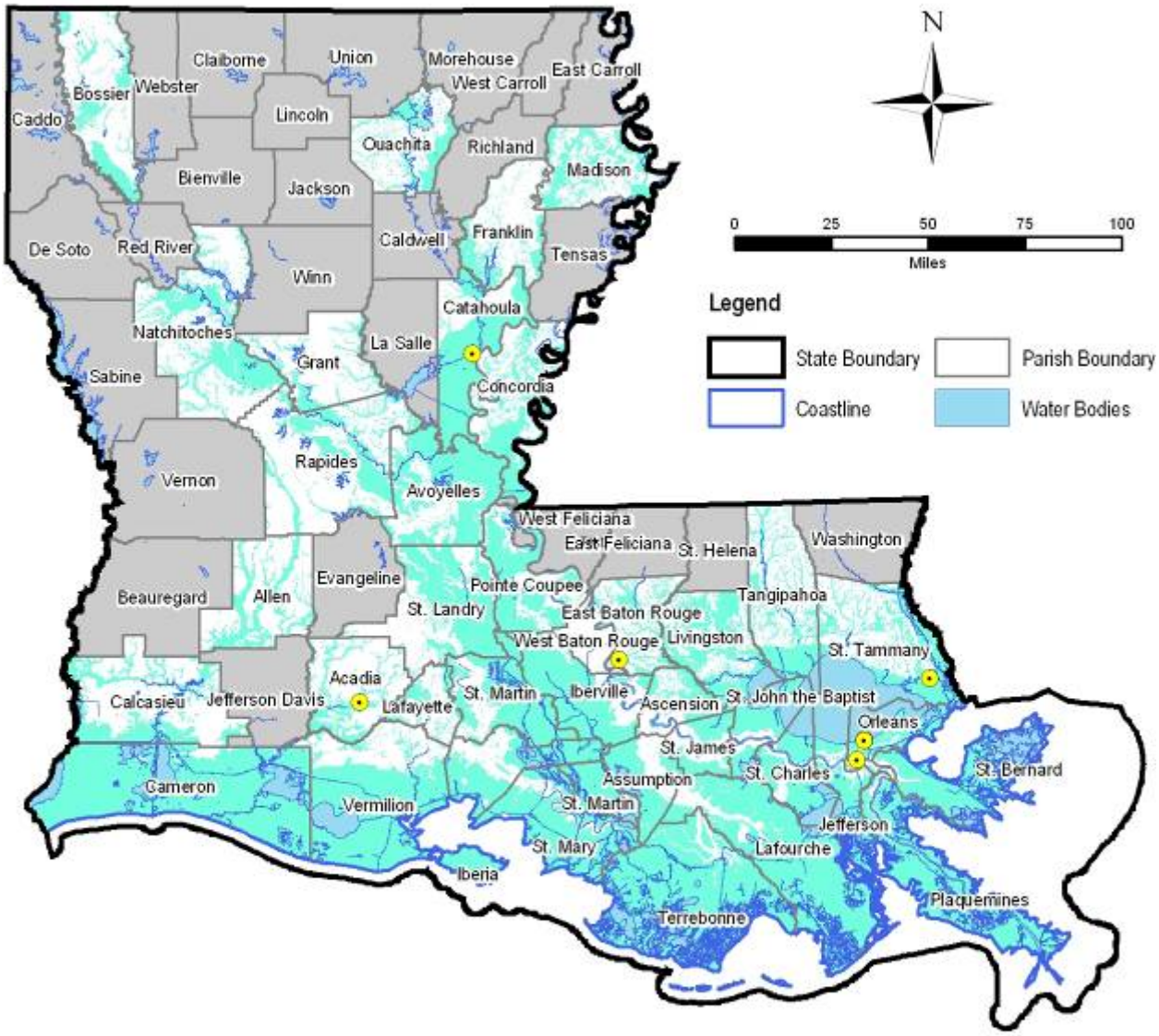
Highest Loss Facilities

Source: Louisiana Facility Management Database

Q3 Flood Data No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-13: Loss Estimate - Flood - Top 10 - Executive Department



Highest Loss Facilities

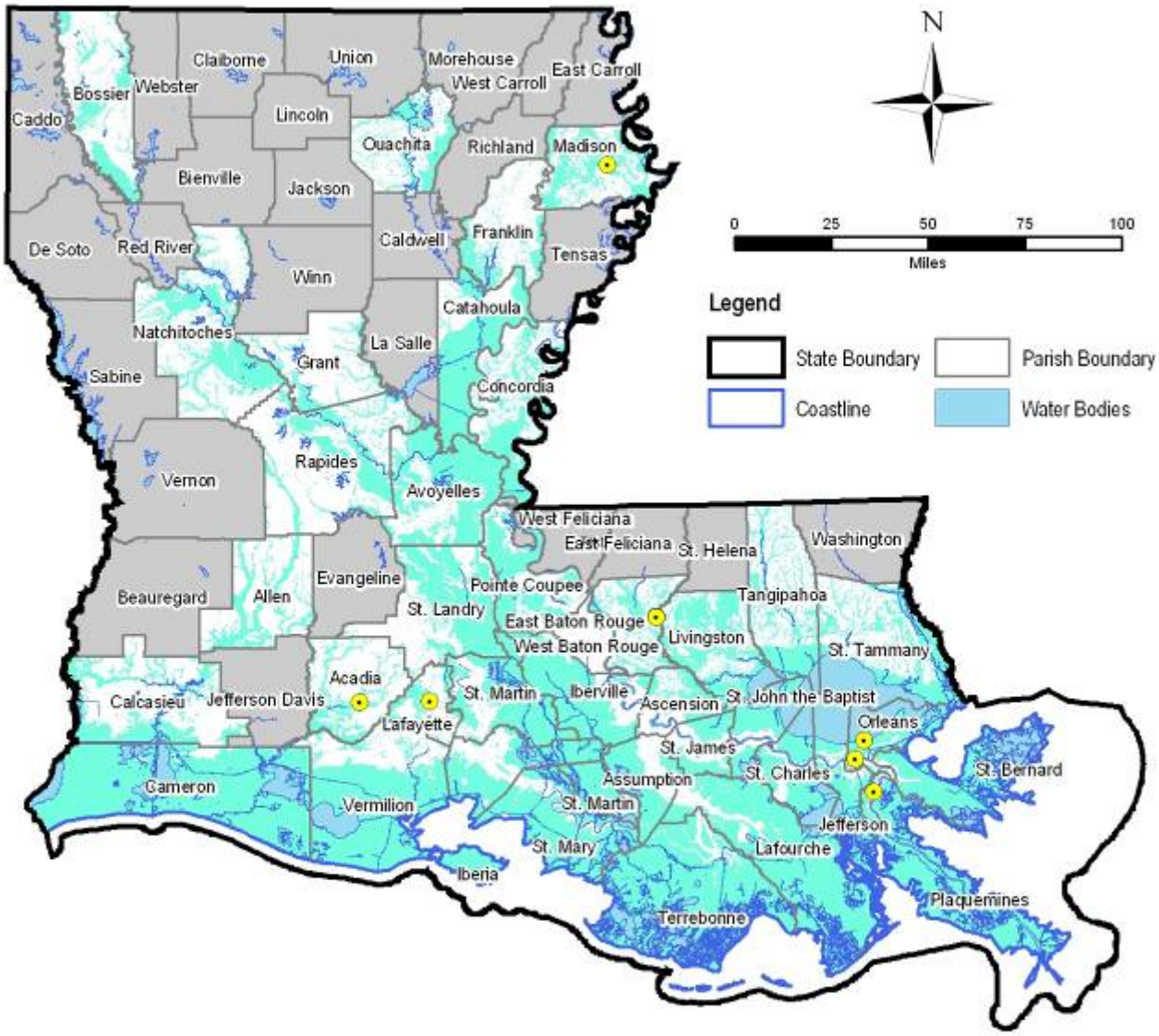
Source: Louisiana Facility Management Database

Q3 Flood Data

No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-14: Loss Estimate - Flood - Top 10 - Department of Health and Hospitals



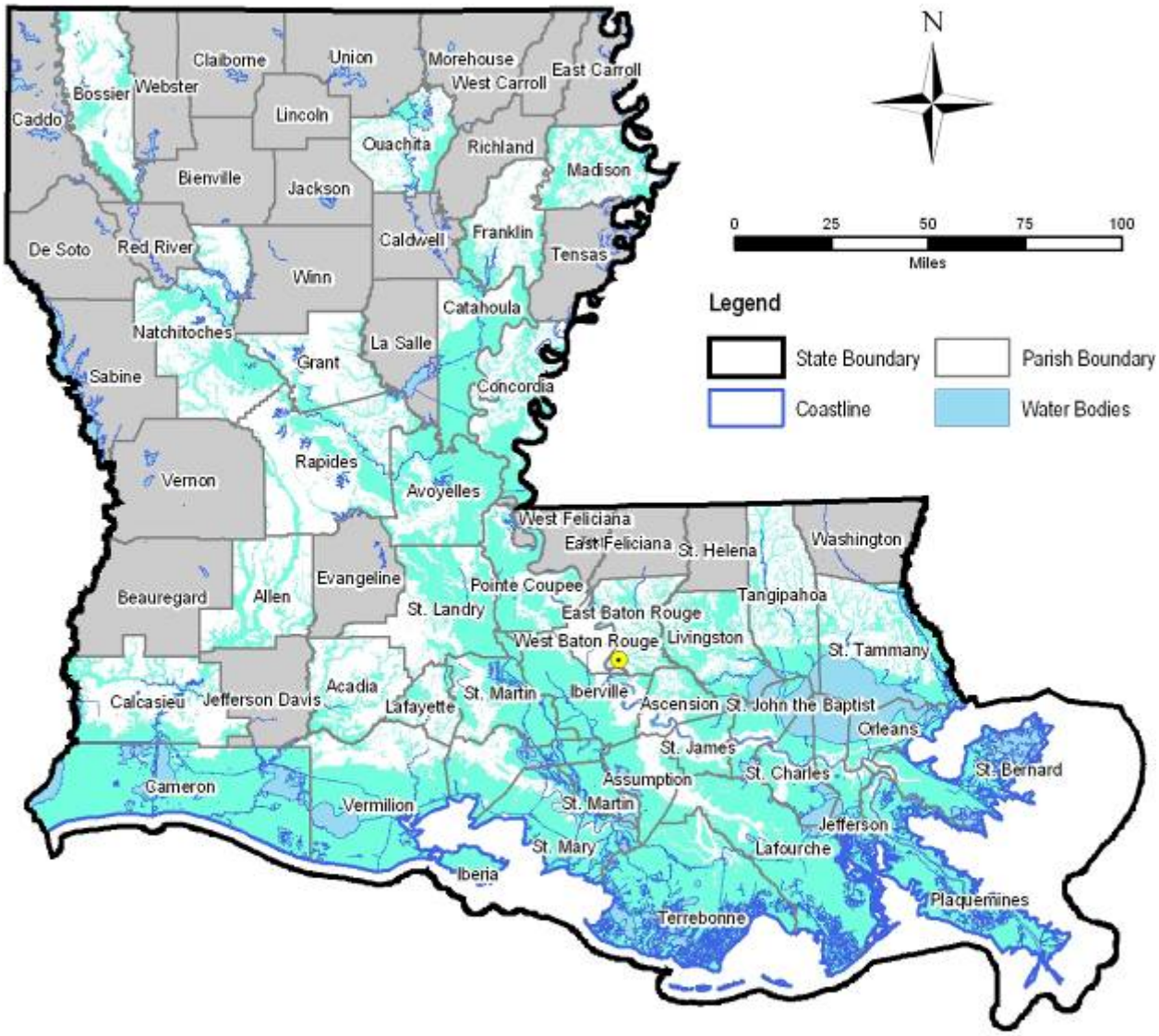
Highest Loss Facilities

Source: Louisiana Facility Management Database

Q3 Flood Data | No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-15: Loss Estimate - Flood - Top 10 - Department of Labor



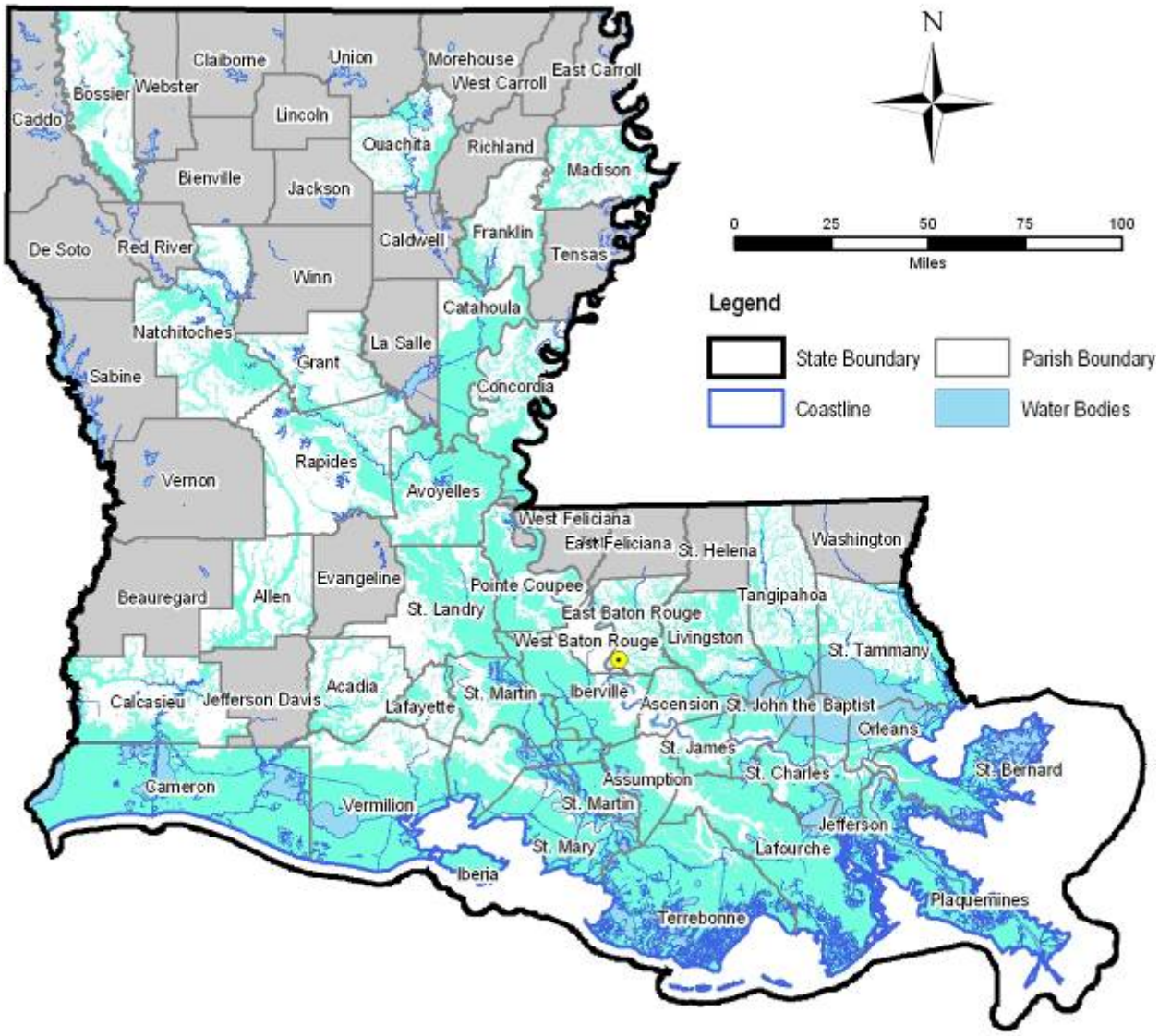
Highest Loss Facilities

Source: Louisiana Facility Management Database

Q3 Flood Data | No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-16: Loss Estimate - Flood - Top 10 - Non-Appropriated Requirements



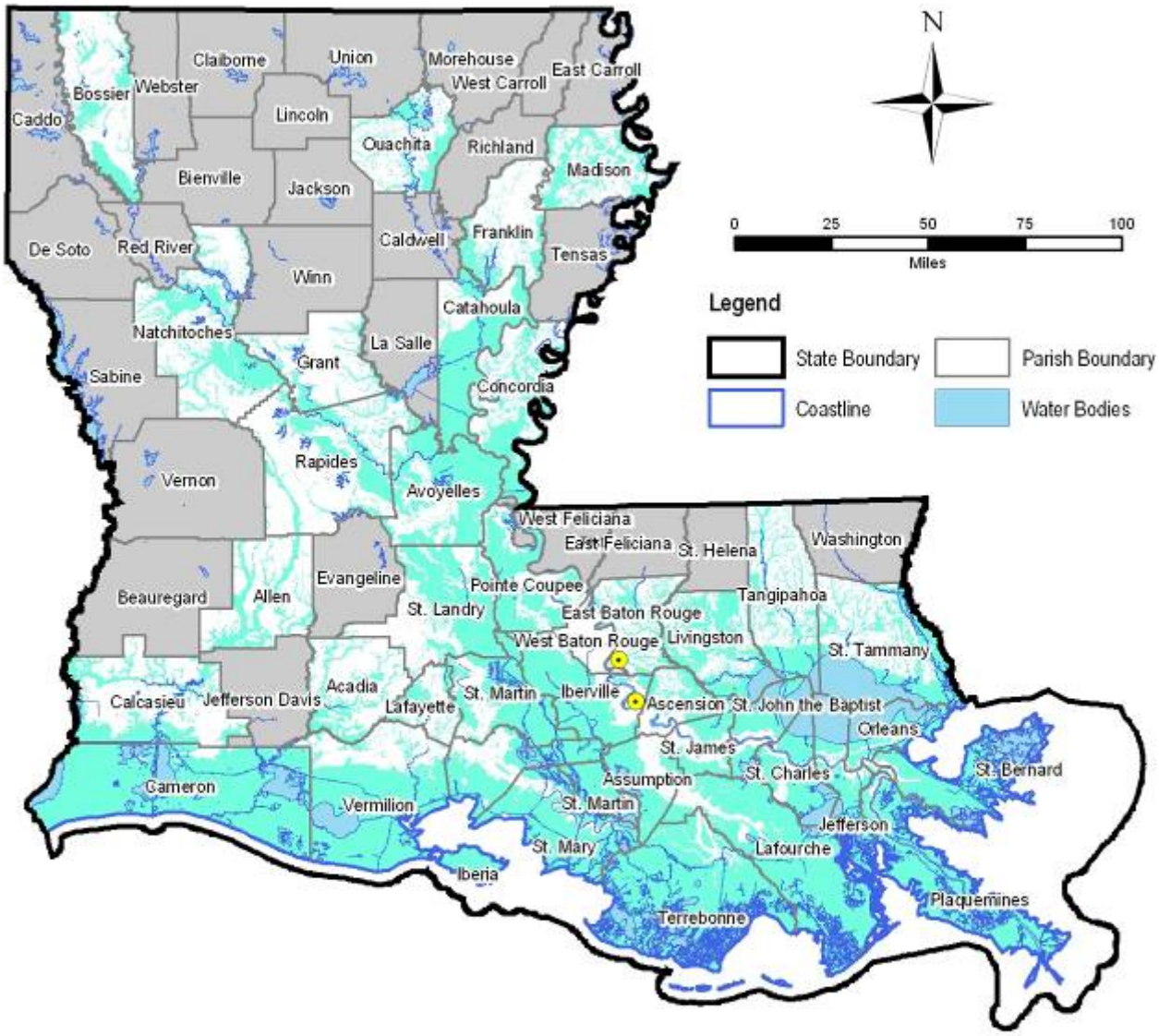
Highest Loss Facilities

Source: Louisiana Facility Management Database

Q3 Flood Data No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-17: Loss Estimate - Flood - Top 10 - Other Requirements



Highest Loss Facilities

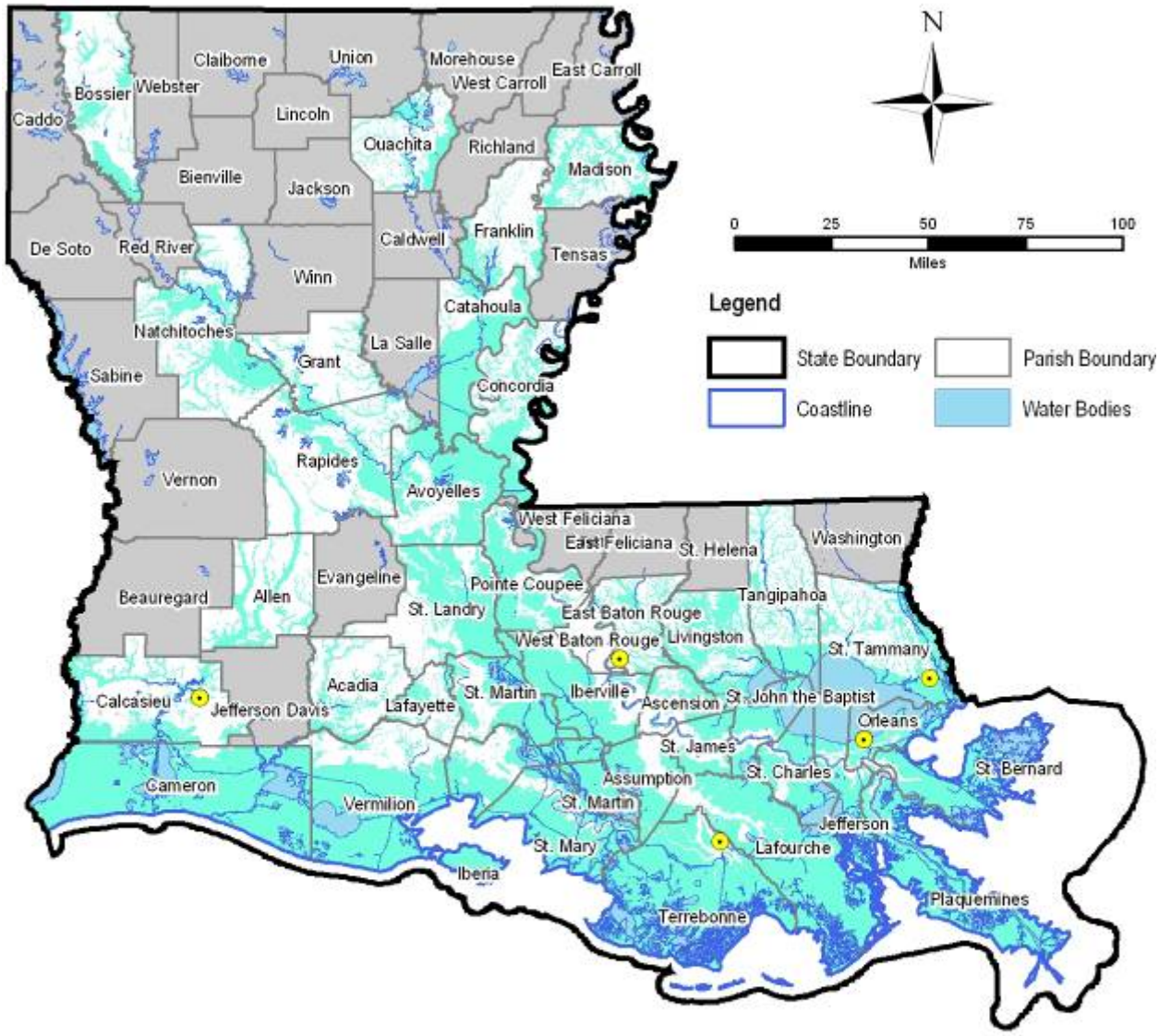
Source: Louisiana Facility Management Database

Q3 Flood Data

No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-18: Loss Estimate - Flood - Top 10 - Department of Transportation and Development



Highest Loss Facilities

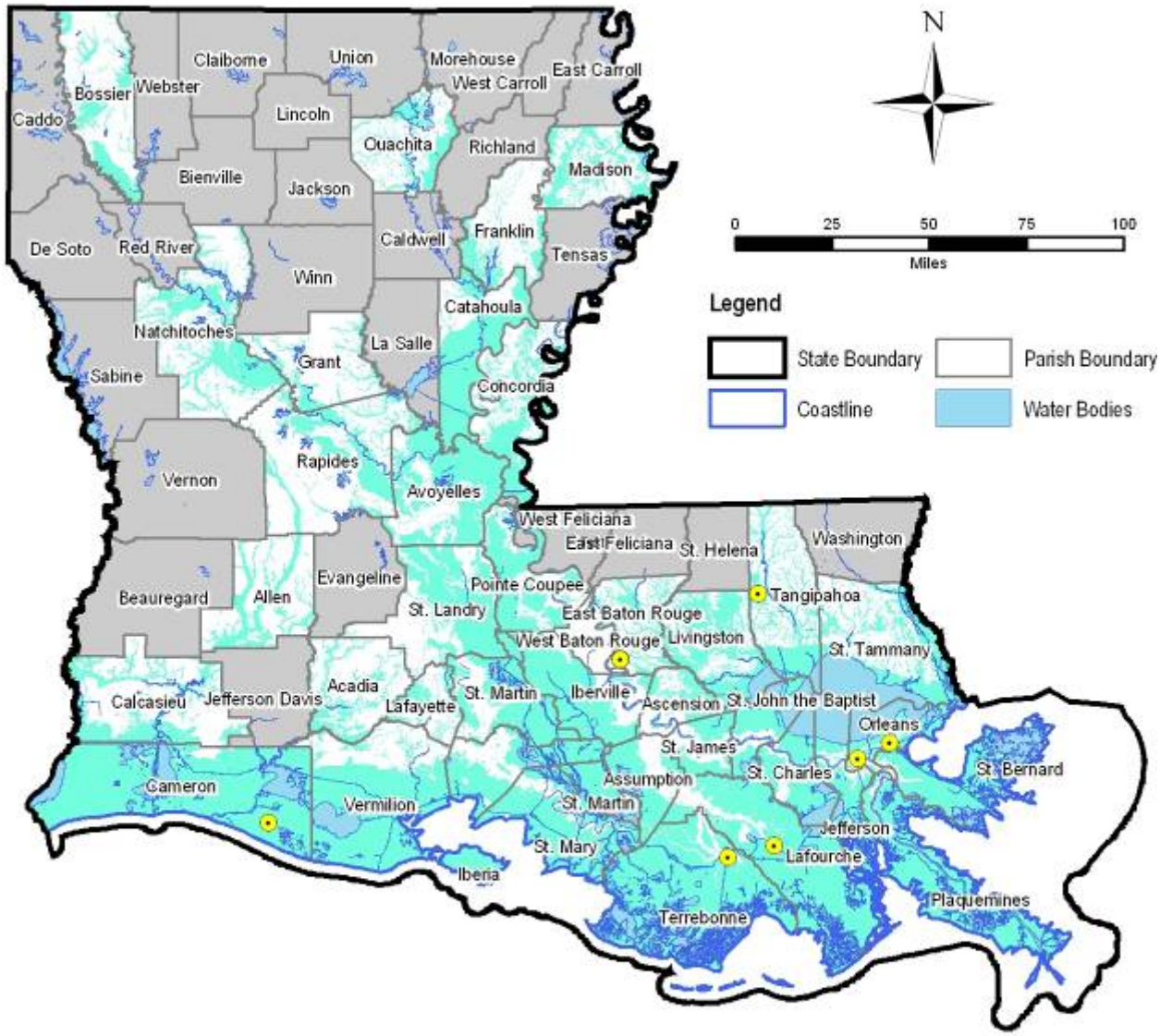
Source: Louisiana Facility Management Database

Q3 Flood Data

No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-19: Loss Estimate - Flood - Top 10 - Unknown Departments



Highest Loss Facilities

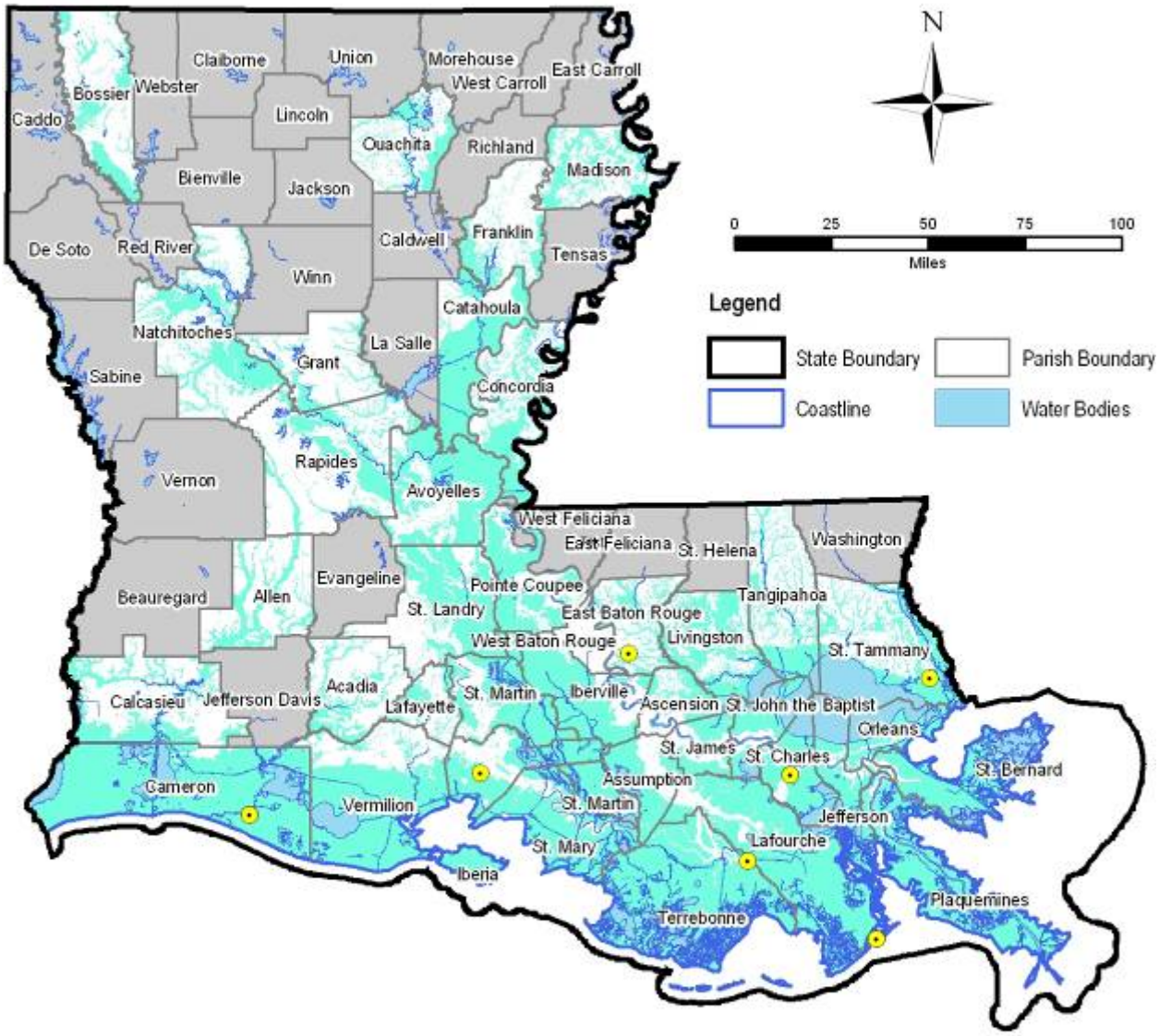
Source: Louisiana Facility Management Database

Q3 Flood Data

No Q3 Flood Data Available

Source: FEMA Q3 Flood Data

Map F-20: Loss Estimate - Flood - Top 10 - Department of Wildlife and Fisheries



Highest Loss Facilities

Source: Louisiana Facility Management Database

Q3 Flood Data No Q3 Flood Data Available

Source: FEMA Q3 Flood Data